

Application No.: 10/664,883

REMARKS

This Amendment is being filed in response to the Office Action dated June 22, 2007. In view of these amendments and remarks this application should be allowed and the case passed to issue. No new matter is introduced by this amendment. Support for the claim amendments is found throughout the specification and the claims as originally filed. For example, the amendment to claim 1 is supported by previous claim 9; and the specification at page 8, lines 10-20; page 11, lines 21 to page 12, line 1; and Fig. 5. Support for the amendment to claim 5 is found in the second embodiment (page 18, lines 23-25). The third embodiment (page 19, line 20 to page 20, line 2) supports the amendment to claim 6. Claims 8 and 13 are amended to correct informalities. Support for the amendment to claim 13 is found in Figs. 4 and 5, and the specification at page 8, lines 10-25. The specification at page 8, lines 10-25 provides support for new claim 14. New claims 15 and 16 are supported by the specification at page 8, lines 10-20; Fig. 11; and previous claims 9 and 10, respectively. New claim 17 is supported by previous claim 12; the specification at page 12, lines 15-20; and Figs. 4 and 5. The specification, at page 11, line 25 to page 12, line 1, supports new claims 18 and 19.

Claims 1-8 and 10-19 are pending this application. Claims 1-13 are rejected. Claims 1, 5, 6, 8, 12, and 13 have been amended in this response. Claim 9 has been canceled in this response. New claims 14-19 have been added in this response.

Claim Rejections Under 35 U.S.C. § 112

Claims 8 and 13 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Claims 8 and 13 have been amended to correct the asserted informalities. Applicants submit that the claims fully comport with the requirements of 35 U.S.C. § 112.

Application No.: 10/664,883

Claim Rejections Under 35 U.S.C. § 102

Claims 1, 4, 5, and 7 were rejected under 35 U.S.C. § 102(b) as being anticipated by Uchino et al. (JP 2002-075455). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a stacked battery (30) comprising an electrode stacked body (7) formed by stacking a sheet electrode (10) and an electrolyte layer (4). The electrode (10) includes a single-layered collector (1). The electrolyte layer (4) is placed between the electrodes (10). The collector (1) has an approximately rectangular shape in a plane perpendicular to the stacking direction. A packaging material (5a, 5b) houses the electrode stacked body (7). The packaging material (5a, 5b) has an opening which faces the stacking direction of the electrode stacked body (7). The electrodes (10) are placed on outermost layers of the electrode stacked body (7) in such a manner so that the single-layered collectors (1a, 1b) are exposed through the opening to an outside of the stacked battery (30) in the stacking direction of the electrode stacked body (7) and function as terminals. A center of the surface of the collector, is a surface perpendicular to the stacking direction of the electrode stacked body, is exposed through the opening to the outside of the stacked battery.

The Examiner asserted that Uchino et al. teach a stacked lithium ion secondary battery comprising sheet electrodes including a collector and a polymer electrolyte positioned between the electrodes which are located on the outermost layers in such a manner that the collectors are exposed to the outside and function as terminals. The Examiner further asserted that the charge collectors and leads welded to the charge collectors become one piece, and form a unified charge collector.

Application No.: 10/664,883

Uchino et al., however, do not anticipate the claimed stacked battery because Uchino et al. do not disclose a center of a surface of the collector, which is a surface perpendicular to the stacking direction of the electrode stacked body, is exposed through the opening to the outside of the stacked battery, as required by claim 1. It is noted that this limitation was previously recited in claim 9, and claim 9 was not rejected as being anticipated by Uchino et al.

In a conventional stacked battery, as shown in Fig. 1, current flows in the longitudinal direction of each tab (104) when current is drawn outside the battery package (105). In addition, the current flows in the longitudinal direction of the collector (101) in the collectors (101) at both ends of the electrode stacked body (7). This reduces power due to the resistance of the current flow through the tabs (104) and the collectors (101) (see page 2, lines 15-26 of the specification).

The stacked battery of the present invention, however, has a feature that the approximately rectangular-shaped collectors (1a, 1b) themselves are exposed through the opening, which faces the stacking direction of the electrode stacked body, of the laminated sheet (5a,5b) to the outside of the battery (30) in the stacking direction of the electrode stacked body (7), and thereby the collectors (1a, 1b) function as the positive and negative terminals, respectively. Hence, there is no need to attach a tab or the like to the collector (1a, 1b) in order to draw the current outside the battery, thus it is possible to prevent a loss of power due to the resistance of the tab while the current flows through the tab. In addition, current does not flow along the collectors toward the tabs, and thereby the distance which the current flows is shorter. Hence, the power loss is further reduced (see page 9, line 18 to page 10, line 5).

Uchino et al. disclose a lithium secondary battery which has electric power-generating elements (4) including collectors (15, 16), tabs (7, 9) and a casing (10) (see Figs. 1 and 2). The battery of Uchino et al. has stacked power generating elements (4) housed in a casing (10).

Application No.: 10/664,883

The Uchino et al. structure is similar to Fig. 1 of the present specification and suffers from the same power losses. The battery according to the present invention, however, does not need tabs, and therefore, does not suffer from power loss due to the resistance of the tabs.

The present claims are further distinguishable because the batteries of Uchino et al. are connected in series and electrical connectors are required to connect the individual batteries, resulting in additional power losses over the battery module. In the present invention, on the other hand, the collectors function as terminals and the individual batteries can be stacked directly on one another, the positive collector of one battery making direct electrical contact with the negative collector of the immediately adjacent battery. No additional electrical connectors are required between the batteries of the present invention. Thus, power losses in battery modules according to the present invention are further reduced.

The factual determination of lack of novelty under 35 U.S.C. § 102 requires the disclosure in a single reference of each element of a claimed invention. *Helifix Ltd. v. Blok-Lok Ltd.*, 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 399, 36 USPQ2d 1101 (Fed. Cir. 1995); *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051 (Fed. Cir. 1987). Because Uchino et al. do not disclose a center of a surface of the collector, which is a surface perpendicular to the stacking direction of the electrode stacked body, is exposed through the opening to the outside of the stacked battery, as required by claim 1, Uchino et al. do not anticipate claim 1.

Applicants further submit that Uchino et al. do not suggest the claimed stacked battery.

Application No.: 10/664,883

Claim Rejections Under 35 U.S.C. § 103

Claims 2, 3, 6, and 8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Uchino et al. in view of Arias (U.S. Pat. No. 5,618,641). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The Examiner asserted that Uchino et al. do not disclose the bipolar electrodes or stacked batteries arranged in parallel. The Examiner relied on the teachings of Arias to assert that it would have been obvious provide a stacked battery configuration with bipolar electrodes in order to achieve the desired voltage and current in a more compact structure and to seal the battery to prevent gases from escaping from the battery.

The combination of Uchino et al. and Arias does not suggest the claimed stacked battery because Arias does not cure the deficiencies of Uchino et al. Arias does not suggest a center of a surface of the collector, which is a surface perpendicular to the stacking direction of the electrode stacked body, is exposed through the opening to the outside of the stacked battery, as required by claim 1.

Claims 1-3, 5, 9, 11, and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Williams et al. (US 5,254,415) in view of Yamamoto et al. (U.S. 2003/0129495). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The Examiner asserted that Williams et al. teach a stacked bipolar battery. The Examiner relied on Yamamoto et al. to assert that the secondary batteries may be any number of shapes.

The combination of Williams et al. and Yamamoto et al. do not suggest the claimed stacked battery. Williams et al. and Yamamoto et al. do not suggest the claimed stacked battery comprising single-layered collectors, as required by claims 1 and 13. As illustrated in Fig. 1, Williams et al. disclose that positive and negative terminals (16, 18) are exposed through an

SEP 24 2007

Application No.: 10/664,883

opening to an outside of a stacked cell array (12) in the stacking direction of the stacked cell array (12), but fail to disclose current collectors (30A, 32N) are exposed through the opening to the outside of the stack cell array (12). Further, the positive terminal (16) and the current collector (30A) (and negative terminal (18) and current collector (32N) are placed on an outermost of the cell stack array (12). Thus, an electric current flows through the positive terminal (16) and the current collector (30A), thereby the output power is reduced due to an increase in the electrical resistance between the positive terminal (16) and the current collector (30A).

In the present invention, however, the outermost current collectors (1a, 1b) are single-layered, therefore increased electrical resistance, such as in the Williams et al. battery, is not created.

The dependent claims, including new claims 14-19, are allowable for at least the same reasons as the respective independent claims from which they depend and further distinguish the claimed stacked battery.

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

Application No.: 10/664,883

SEP 24 2007

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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